

CLAIMS:

What is claimed is:

- 1 1. An apparatus comprising:  
2 a combination digital signal and radio frequency connector for  
3 directly coupling a motherboard to a radio frequency module board.
- 1 2. The apparatus of Claim 1, further comprising a pin and receptacle  
2 connection for a signal line in the radio frequency connector.
- 1 3. The apparatus of Claim 2, wherein the receptacle comprises a sheet of  
2 metal stamped and rolled into a tulip shape.
- 1 4. The apparatus of Claim 1, further comprising a spring cage and barrel  
2 connection surrounding the ground line.
- 1 5. The apparatus of Claim 4, wherein the spring cage and barrel  
2 comprise a sheet metal stamped and rolled into a substantially cylindrical  
3 form.
- 1 6. The apparatus of Claim 4, wherein the spring cage comprises finger  
2 springs having flexural compliance that retains a close contact against an  
3 inner surface of the barrel upon mating.
- 1 7. An apparatus comprising:  
2 a radio frequency board having a combination digital signal and radio  
3 frequency connector adapted for directly coupling to a motherboard for a  
4 computer.
- 1 8. The apparatus of Claim 7, further comprising a pin and receptacle  
2 connection for a signal line in the radio frequency connector.
- 1 9. The apparatus of Claim 8, wherein the receptacle comprises a sheet of  
2 metal stamped and rolled into a tulip shape.

1 10. The apparatus of Claim 7, further comprising a spring cage and barrel  
2 connection surrounding the ground line.

1 11. The apparatus of Claim 10, wherein the spring cage and barrel  
2 comprise a sheet of metal stamped and rolled into a substantially cylindrical  
3 form.

1 12. The apparatus of Claim 10, wherein the spring cage comprises finger  
2 springs having flexural compliance that retains a close contact against an  
3 inner surface of the barrel upon mating.

1 13. An apparatus comprising:  
2 a pin and receptacle connection for transferring a signal coupled  
3 between a radio frequency module compatible with a mobile computer  
4 motherboard and a motherboard in a mobile computer; and  
5 a spring cage and barrel connection coupled around the pin and  
6 receptacle connection for transferring ground, wherein the apparatus  
7 comprises a radio frequency coaxial direct board to board connection.

1 14. The apparatus of Claim 13, wherein the receptacle comprises a sheet  
2 metal stamped and rolled into a tulip shape.

1 15. The apparatus of Claim 13, wherein the receptacle and the spring cage  
2 are made from at least one of phosphor bronze, beryllium copper and brass.

1 16. The apparatus of Claim 13, wherein the pin and barrel comprise a  
2 copper alloy.

1 17. The apparatus of Claim 16, wherein copper alloy is plated to avoid  
2 corroding.

1 18. The apparatus of Claim 13, wherein the spring cage and barrel  
2 comprise a sheet metal stamped and rolled into a substantially cylindrical  
3 form.

1 19. The apparatus of Claim 13, wherein the spring cage comprises finger  
2 springs having flexural compliance that retains a close contact against an  
3 inner surface of the barrel upon mating.

1 20. The apparatus of Claim 13, wherein the ground connection from the  
2 spring cage and barrel are each coupled to a surface co-planar waveguide  
3 ground on their respective boards.

1 21. The apparatus of Claim 20, wherein the co-planar waveguide  
2 grounds are coupled to their respective printed circuit board ground planes  
3 by vias in the boards.

1 22. An apparatus comprising:  
2 a direct board to board coaxial connection having a male portion and  
3 a female portion, wherein one of the male portion or female portion is  
4 coupled to a computer motherboard and the other of the male portion or  
5 female portion is coupled to a radio frequency module card such that the  
6 radio frequency module card is removeably coupled to the computer  
7 motherboard by the direct board to board coaxial connection.

1 23. The apparatus of Claim 22, wherein the coaxial connection comprises  
2 a pin and receptacle connection for transferring the signal, and a spring cage  
3 and barrel connection for transferring the ground.

1 24. The apparatus of Claim 23, wherein the spring cage and barrel  
2 transfer the ground to a surface co-planar waveguide ground and then to  
3 the ground planes of the boards through vias.

1 25. A method comprising:  
2 forming a signal pin;  
3 stamping a ground shield spring cage from a sheet of metal;  
4 rolling the ground shield spring cage to form a cage with finger  
5 springs for gripping the inside of a ground barrel;  
6 stamping a ground barrel from a sheet of metal;

7 rolling the ground barrel into a cylinder;  
8 stamping a signal pin receptacle from a sheet of metal;  
9 rolling the signal pin receptacle to form a cylinder with a spring end  
10 that resembles a tulip;  
11 plating the pin and the barrel;  
12 assembling the signal pin, ground spring cage, and a housing to form  
13 a male coaxial connector by press interference fitting; and  
14 assembling the signal pin receptacle, ground barrel and a housing to  
15 form a female coaxial connector by press interference fitting.

1 26. The method of Claim 25, further comprising:  
2 fabricating the ground shield spring cage and signal pin receptacle  
3 from one of the group comprising phosphor bronze, beryllium copper, or  
4 brass.

1 27. The method of Claim 26, further comprising:  
2 fabricating the signal pin and outer ground shield from a copper  
3 alloy.

1 28. A method comprising:  
2 aligning a radio frequency module board compatible with a computer  
3 motherboard with a computer motherboard; and  
4 connecting the radio frequency module board to the motherboard of a  
5 computer using direct board to board radio frequency coaxial connectors  
6 wherein the connectors comprise a signal pin, a signal pin receptacle, a  
7 ground shield spring cage and a ground shield barrel; and the signal pin  
8 receptacle, ground shield spring cage and ground shield barrel are fabricated  
9 from stamped sheets of metal.

1 29. The method of Claim 28, further comprising:  
2 coupling the signal pin to the signal pin receptacle to form a signal  
3 line connection between the radio frequency module board and the  
4 computer motherboard.

- 1 30. The method of Claim 28, further comprising:
- 2 coupling the ground shield spring cage to the ground shield barrel to
- 3 form a ground shield connection for the signal line connection between the
- 4 radio frequency module board and the computer motherboard.